BULLETIN

OF THE

ESSEX INSTITUTE.

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REGULAR MEETING, MONDAY, MARCH 4TH, 1872.

THE President in the chair. Records of preceding meeting read.

THE OLD CARVED CHAIR.

From a letter of E. W. Farley, Esq., of Newcastle, Me., recently received, we learn that the curious old carved oaken chair, which was given to the Historical Society, June 27, 1821, by Robert Brookhouse, of Salem, is a complete counterpart of the one in his possession, and as far as antiquity and style are concerned, these two chairs are perhaps unequalled by any to be found in New England. Mr. Brookhouse received this chair from the family of Major John Farley, of Newcastle, Me., a native of Ipswich, Mass. Mr. Brookhouse's first wife was a daughter of said Farley, and Mr. Farley's wife was Sarah Dennis of Ipswich. This chair was one of four pieces of furniture of similar wood and carvings belonging to said Sarah Dennis, and was taken to Newcastle on her removal there in 1772 or 1773 — consisting of two

arm chairs, alike in pattern, a tape loom and a chest now in the possession of Mrs. E. G. Perkins, of Salem, having upon it the date "1634;" and there is reliable traditional evidence of the age of said furniture corresponding with the year 1634, and that these articles were brought over from England by the first emigrant of the Dennis family of Ipswich.

A RELIC OF "YE OLDEN TIME,"—A STONE MILL.

In form the mill is mortar like, about as large as a peck measure, with the furred stone fitting so as to make an effectual grinder. It is similar to the stone mills spoken of in the Bible, which the Jewish women used. It was presented by Mr. D. L. D. Balch, of Amesbury, accompanied by the following letter:—

AMESBURY, FEBRUARY 7, 1872.

To the Officers of the Essex Institute:—

GENTLEMEN:—In accordance with a purpose long entertained by me, I hereby offer for your acceptance the "Stone Mill" which was brought to this country by "Lieut. Francis Peabody," in the year 1635.

This "mill" has been preserved in the Peabody family from that date to the present time, mostly at Topsfield. It was finally presented to my father, the late Israel Balch, M. D., some sixty years ago, by Jacob Peabody, and by him kept till his death in 1858.

It was my father's special request that this relic of "ye olden time" should be presented to your Institute, and it is not only a duty but a pleasure to comply with the same.

Trusting that this ancient memento of the ancestor of that honored benefactor, the late George Peabody, may be accepted and preserved through all coming time, I am

Your obedient servant, D. L. D. BALCH.

HOWARD STREET CHURCH.

Mr. GEORGE D. PHIPPEN presented a communication from Rev. C. C. Beaman, formerly of this city, on "The Closing History of the Branch or Howard Street Church in Salem." Referred to the committee on publications

for insertion in the "Historical Collections." At a meeting of the Institute, Monday evening, Jan. 20th, 1862, Rev. Mr. Beaman read an interesting historical sketch of this church, with brief notices of the several ministers who have successively officiated in that place. This paper was printed in the "Historical Collections of the Essex Institute," Vol. iii, page 272.

CLEAVELAND'S JOURNALS.

Mr. A. C. Goodell, Jr., read a letter from Nehemiah Cleaveland, of Westport, Conn., tendering to the Institute some journals written by his grandfather, Rev. John Cleaveland, of Chebacco parish, in Ipswich. The thanks of the Institute were tendered to Mr. Cleaveland for his generous offer, and Mr. Goodell was requested to communicate the same.

The SECRETARY announced the following additional correspondence :—

From L. D. Gould, Boston Highlands, Feb. 23; S. A. Green, Boston, Feb. 28; B. H. Hall, Troy, N. Y., Feb. 27, Mch. 1; Francis Harrington, Boston, Feb. 23; John F. McCoy, New York, Feb. 17, 21; S. A. Nelson, Georgetown, Feb. 19, 29; John H. Sage, Hartford, Conn., March 1; W. Hudson Stephens, Lowville, N. Y., Feb. 20; A. Woodward, Franklin, Conn., Feb. 20.

The LIBRARIAN reported the following additions :—

By Donation.

BUTLER, HON. B. F., of Washington, D. C. Speech of Hon. Roscoe Conkling in U. S. Senate, Feb. 19, 1872. 8vo pamph.

KIMBALL, JAMES. Proceedings of the Right Worthy Grand Lodge, I. O. O. F. of Mass. 1867, '8, '9, '70, '71. 9 nos. The World Almanac, 1868, '9, '70, '71, '72. Miscellaneous pamphlets, 10.

MANCHESTER PUBLIC LIBRARY. Eighteenth Annual Report of the Trustees, Dec. 31, 1870. 12mo pamph.

MANNING, ROBERT. Journal de l' Agriculture, Tome iv, 1869, 5 nos. Tome i, ii, iii, 1870. 17 nos. Der Farmers Freund, 1871.

PALFRAY, C. W. Miscellaneous pamphlets, 8.

PERLEY, EDWARD. Directory of St. Paul for 1863. 1 vol. 8vo.

STEPHENS, W. H. of Lowville, N. Y. Directory of Harrisburg for 1839. 1 vol.

STONE, EDWIN M. Thirtieth Annual Report of the Ministry at Large. Jan. 2, 1872. 8vo pamph.

SUMNER, HON. CHAS., of Washington, D. C. Department of Agriculture for 1870. 1 vol, 8vo. Washington, 1871.

By Exchange.

ENTOMOLOGICAL SOCIETY OF THE NETHERLANDS IN 'S GRAENHAGUE. Tijdschrift voor Entomologie. Tweede Serie Vijfde. Deel 1-6. Aflerering, 1869-70. Zesde Deel 1, Aflerering, 1871. 7 pamphlets. 8vo.

FLAX EXTENSION ASSOCIATION IN IRELAND. Third and Fourth Annual Reports of, for the Improvement of the Culture of Flax in Ireland, 1869-70. 2 pamphs. 12mo. Instruction for the Culture and Preparation of Flax in Ireland. 12mo pamph.

GEOLOGICAL AND POLYTECHNIC SOCIETY OF WEST RIDING OF YORKSHIRE. Proceedings of, 1870. 8vo pamph. Leeds, 1871.

KONGLIGA VENTENSKAPS SOCIETETEN, UPSALA, SWEDEN. Nova Acta, Ser. III, Vol. vii. Fasc. I, II. 1869-70. 2 pamphs. 4to. Upsaliæ, 1869-70. Bulletin Météorologique Mensuel, Vol. ii, Nos. 1-12, 1869-70. Vol. iii, Nos. 1-6, 1870-71.

L'INSTITUTE ROYAL GRAND-DUCAL DE LUXEMBURG (CI-DEVANT SOCIÉTÉ DES SCIENCES NATURELLES). Publications, Tome xi.—Années 1869 et 1870. 8vo pamph.

NATURFORSCHENDE GESELLSCHAFT IN BAMBERG. Bericht. 1869-70. 8vo pamph.

NATURFORSCHENDE GESELLSCHAFT IN BASEL. Verhandlungen, Theil 5. Heft 3. 8vo pamph.

NATURFORSCHENDE GESELLSCHAFT IN GÖRLITZ. Abhandlungen, Bd. xiv, 1871. 8vo. Görlitz. 1871.

NATURWISSENSCHAFTLICHE GESELLSCHAFT "ISIS" IN DRESDEN. Sitzungsberichte, 1871. Juli, Aug., Sept. 8vo pamph.

PHILOSOPHICAL AND LITERARY SOCIETY IN LEEDS. Annual Report, 1870-71. 8vo pamph. Leeds, 1871.

ROYAL SOCIETY OF LONDON. Proceedings of, Vol. xviii, Nos. 119-122, Vol. xix, 123-129. 11 pamphlets. 8vo.

SOCIÉTÉ D'AGRICULTURE, SCIENCES ET ARTS DE LA SARTHE, LE MANS. Bulletin, Tomes xi, xii, xiii. 1870, 1871.

SOCIÉTÉ D'ANTHROPOLOGIE IN PARIS. Bulletins, Tomes iv, v. 1869-70.

SOCIÉTÉ DE PHYSIQUE ET D'HISTORIE NATURELLE IN GENÈVE. Mèmoires, Vol. xxi. part I. 4to pamph. Table des Mèmoires Tomes I A. XX. 4to pamph.

SOCIÉTÉ ENTOMOLOGIQUE DE RUSSIA IN ST. PETERSBURG. Horæ Societatis Entomologicæ Rossicæ, Tome vii, No. 4. Tome vii, No. 2. 1871.

SOCIÉTÉ MALACOLOGIQUE DE BELGIQUE IN BRUXELLES. Annales, Tome v. 1870. 8vo pamph.

VEREIN ZUR VERBREITUNG NATURWISSENSCHAFTLICHER KENNTNISSE IN WIEN. Schriften, Band xi, Jahrg. 1870-71. 16mo pamph.

BIBLIOTHÈQUE UNIVERSELLE ET REVUE SUISSE. Archives des Sciences physiques et naturelles. Oct. 15, 1871. No. 166. 8vo pamph. 1871.

IOWA STATE HISTORICAL SOCIETY. Annals of, Jan., 1872. 8vo pamph.

NEW YORK GENEALOGICAL AND BIOGRAPHICAL SOCIETY. Record of, Jan., 1872. 8vo pamph.

RHODE ISLAND HISTORICAL SOCIETY. Roger Williams, a paper read before the Society, Nov. 8, 1871. By Thomas T. Stone. 8vo pamph.

PUBLISHERS. American Chemist. American Journal of Science and Arts. Canadian Journal. Gloucester Telegraph. Haverhill Gazette. Land and Water. Lawrence American. Little Giant. Lynn Reporter. Lynn Transcript. Medical and Surgical Reporter. Nation. Nature. Peabody Press. Shoe and Leather Journal.

Mr. S. A. Nelson of Georgetown read the following communication on

THE METEOROLOGY OF MOUNT WASHINGTON.

The mountainous region of New Hampshire north of Lake Winnipiseogee, known as the White Mountains has a north and south extension of about sixty miles, and on a cross line is not far from thirty miles wide.

The several ranges are naturally divided into groups, as the Moosilauke group in the southwest, the Franconia region westerly, to the south the Pemigewasset Mountains, centrally the Mount Washington group, and to the north the Stratford Peaks, together with others of less importance.

The Mount Washington group has an area of not far from thirty miles long and fifteen wide and has a northeast and southwest course. Centrally in this range is Mount Washington, in latitude 44°, 16′, 25″ and longitude 71°, 16′, 26″, west from Greenwich. The altitude is 6,293 feet and it is the highest peak in the group by 500 feet, and the highest east of the Mississippi with the exception of Clingman's Peak in western North Carolina.

Prof. Edward Tuckerman marks out four regions on Mount Washington: First, the *lower forest*, where are found the hard wood species of the lowlands, with the white spruce and fir, forming a dense forest. Secondly, the *upper forest*, composed of black spruce, fir, Frazer's balsam fir, a mountain ash, with rarely the canoe and yellow birch. At four thousand feet altitude these trees become dwarfed and are only found above this height in a few sheltered localities on the southern side of the mountain. The plants in the third, or *sub-Alpine region*, correspond to like localities in mountain regions generally, and from a little below the summit, upward, is the *Alpine* region,

with many plants native to Labrador and Greenland. The change of climate from the base to the summit is equivalent to that of several degrees north.

In this paper I shall confine my remarks exclusively to the meteorological phenomena of the mountain. An extended inquiry would be of greater value, but it is impossible to more than briefly touch upon the several points under consideration. I do not propose to discuss theories so much as to present facts to show the advantages mountain stations offer over those less elevated.

. Some of the highest authorities have held that the study of meteorology should begin from above. Among these are Biot and Poey. And why meteorologists should have been so long content to study the aspects of the weather within the narrow limits of the lower earth currents, it is hard to decide. It is true that in Europe similar observations to those made on Mount Washington have been maintained for a limited time, but never till the past year in this country, yet nowhere have they been deemed of much value.

When we look through the rifts of a low running S. E. scud, and see, at an altitude of less than a mile, an upper current of cirro-cumulus rapidly moving towards the northeast, or in a fair day, observe it progressing at the rate of fifty miles an hour, while at the surface the wind is not above ten miles — a desire to investigate the phenomenon is aroused, and we devise ways and means to accomplish this end.

Where shall we go but to some lofty mountain peak that rises to the altitude of the atmospheric current in which that stratum of cloud is drifting?

East of the meridian of 105° west from Greenwich, over the whole continent, north of the N. E. trades, there is an atmospheric current constantly flowing in a

northerly direction. It flows in a descending plane differing but slightly from that of the limit of perpetual snow. Its descent is known to be not far from 16,000 feet at the equator to very near the surface at the poles. Over this country its range is from about 3,000 to 12,000 feet and vertically it cannot be far from 6,000 to 8,000 feet.

It varies in direction and elevation with the changing seasons — runs lower in summer than winter — and varying on different parallels, it flows near the earth when no surface wind interferes. Over New England its course is nearly W. S. W. to E. N. E., but west of the Alleghany Mountains it is more southerly. Its elevation and direction also vary in the same latitude with the variations of the weather, and probably correspond with the increase and diminution of magnetic force.

This is the *counter-trade*, and comes to us from the South Atlantic Ocean. Within it form our storms. Its ameliorating influences are seen in the southerly storms of winter, in the gentle southwest gales of April and May. Opposed to this is the dry, northwest wind which sweeps down from the Arctic regions. Many maintain that this is a surface wind. So it is when it has driven itself under the counter-trade and fills the space between that higher current and the earth. But it becomes an intermediate one whenever an easterly wind prevails at the surface, and its place is between the surface wind and the southwesterly upper current of the counter-trade. Our records show that this frequently occurs.

It is not necessary to enlarge upon this, as it is no part of my purpose to combat theories, and I only allude to it at all, that it might be seen clearly wherein Mount Washington, or any isolated peak, is superior to stations less elevated, for the particular department of observations on aërial currents.

These advantages, at Mount Washington, we find in the elevation of more than a mile above sea-level, and that it so nearly reaches the line of perpetual snow, in the considerable height over the surrounding peaks; in the summit being usually above the lower surface winds and lower cloud stratum.

As it is, to a certain extent within the region of the higher upper currents, barometric, thermometric and hygrometric conditions obtain, which do not at lower stations, or in the same time and degree, and of value in connection with them in forecasting storms.

BAROMETRIC OBSERVATIONS.

It is well understood that changes in the velocity of the wind and amount of cloud, exercise a marked influence upon the barometer. These disturbing elements being in full force here, hence the sensitiveness of the instrument and its fluctuations, as well as its wide range. Its sensitiveness is best seen in a nearly calm day when clouds are drifting over; then the mercurial column will not rest for a moment, and yet the range for an hour may not be more than .002 to .004 of an inch. The fluctuations during a gale are very great, frequently from one half hour to another, half an inch or more. The range from December 1st, 1870, to May 14th, 1871, was 1.595 inches. The lowest reading corrected for temperature was 22.120 and the highest was 24.104. The first was during the great gale of December and the last towards the latter part of May. It has a wide range in the great gales, or hurricanes of winter, but not in the summer storms.

Almost hourly observations were taken from 11 A.M., January 22d, to 9.30 A.M. of the 23d. This was one of the three great gales. The range was 1.116. The long-

est and most severe storm of all occurred in February, commencing on the 4th. Observations from 7 A. M. of the 4th to the same hour on the 5th gave a range of 1.403. Other storms gave like results. On the 21st of May thunder showers prevailed over an extended area; but none passed over the mountain or very near. The barometer was depressed, owing more to the intensity of magnetic force than other causes as the weather was fine with us. The 22d was characteristic of the mountain. It was warm, clear and calm in the morning, with a terrific thunder storm at noon and wintry weather at night. At 11 A.M. the temperature was 66°—the highest during the summer with one or two exceptions—at 3 P.M. 26.° The barometric fluctuations were constantly going on early in the morning, falling 1.124 from 8 A.M. to noon. The oscillations of the barometer were in the same time as the discharge of electricity at the telegraph table; both in the afternoon of the 21st and on the 22d.

Humboldt has said, speaking of the horary variations of the barometer, that "no atmospheric circumstances—neither rain, nor fair weather, nor wind, nor tempest—affects the perfect regularity of these oscillations under the tropics; but they subsist alike at all times and in all seasons."

We cannot say this of Mount Washington. On the contrary, as the diurnal variation is governed by the rate of the wind and amount of cloud, it is only in calm, clear weather that it is at the usual hours, and, as it is seldom clear or calm, it may be said that here it does not conform to the general law. The tables of several stations in the New Hampshire Geological Report, compared with Mount Washington, show that on the mountain, there are times of high and low pressure which do not extend to the lower stations. These seem to be confined

to the upper atmosphere. But of the great atmospheric disturbances, covering one or more days' time, having a sweep of thousands of miles, we get, it appears from the record, the first barometric indications at lower stations. In a few instances the Mount Washington record gives earlier indications than the other stations; this is true of the December gale.

Preceding the gale of January 22d and 23d, the highest reading was on the 19th at each place, but it was some hours in advance of Mount Washington at Hanover, N. H., and Lunenburg, Vt., where the maximum obtained at 7 A. M.; at Gorham, N. H., 2 P. M., and at Mount Washington not until 4.57 P.M. At Lunenburg and Hanover, the minimum was on the 21st; at Mount Washington the 22d. The maximum after the gale abated was obtained at Hanover and Gorham the 25th; at Mount Washington and Lunenburg on the 26th at 7 A.M. Lunenburg has an elevation of 1,124 feet, and the climatic conditions more nearly correspond to those of Mount Washington than the other stations above mentioned.

THERMOMETER.

Although our observations in this department are not so complete as we could wish, yet they furnish much interesting and valuable matter, imperfect as they are. We had no spirit thermometer when we most needed it, and our mercurial instruments, though excellent, were too few in number. Dr. Kane says that "errors dependent on wind, sun and local radiation should be carefully guarded against." These remarks apply with much force to Mount Washington especially as regards radiation from clouds lying below the summit.

From partial records for the year from December, 1870, to November, 1871, inclusive, I think the mean tempera-

ture of the year may be not far from —5° Centigrade, equivalent to 23° Fahrenheit. It cannot possibly be so high as the zero isothermal line Centigrade. For the year, that of Montreal is 40°; and the isothermal line of 45° passes a little south of Mount Washington, while the summit enjoys the climate of southern Greenland.

The highest observed temperature was 66°; and the lowest reliable reading of the mercurial thermometer was —54°. On the 5th of February at 3 o'clock in the morning the reading was —59.° That it should read correctly at —54° may be questioned. The freezing point of mercury is not yet well established. Dr. Kane says that "thermometers correct at —40° and agreeing would show a difference of 15° or 20° at —60°." So it was found by Sir James Ross at Leopold Harbor. Nor does Dr. Kane regard "the contraction of colored alcohol at very low temperatures, as sufficiently investigated to enable us to arrive at the cause or quantity of error." "The freezing point of mercury varied" with him "from between —38.5° and 41.5°." Sir Edward Belcher obtained results where the mercury descended as low as —44°. Our thermometers were the Smithsonian standard in the winter, and later the standard instrument made by James Green, of New York — all excellent instruments. In the case under consideration the fall to —54° was gradual; but this is admitted to be no proof that the fall was not due to the contraction of the mercury after it became solid, as this frequently occurred in Dr. Kane's observatory. Of one thing I am fully assured; and it is, that there is much to be learned regarding the freezing point of mercury.

Nothing is more certain than the fact that the rise and fall of temperature, as a rule, is first obtained here. For instance, a low temperature, accompanying the easterly movement of the high, cold, upper wind current, is from

six to thirty-six hours earlier on Mount Washington than at lower stations. High and low temperatures are registered here, which we shall notice under winds, that do not descend to lower levels. On the other hand low temperatures are observed below when there is no change on the mountain. This we shall explain further on. So there are cold terms when the minimum is lower at some not distant stations than here.

As with the barometer so the thermometer has no fixed hours of daily maxima and minima. At Mount Washington there were seventeen days when the maximum was attained at 2 P.M., to ten at 7 A.M., and nine at 9 P.M., or when the readings were the same as at 2 P.M. At Montreal, twenty-nine at 2 P.M., to two at 7 A.M., and five at 9 P.M. At Hanover, twenty-three at 2 P.M. to four each at 7 A.M. and 9 P.M. In winter the changes are sudden and great; often in a half-hour from 5° to 25° and at any period of the twenty-four hours. The change of temperature from Sunday morning, February 5th at 3 o'clock, if we call it at that hour, —54°, to Tuesday noon following, when the thermometer indicated, in the sun, 62°, was 116°. Thirty to forty degrees difference in a day is of common occurrence.

HYGROMETRIC OBSERVATIONS

Were made with great care. During the winter we used wet and dry bulb thermometers hung side by side, and after the warm season opened the Mason Hygrometer. With all our care these froze and so were rûined. For that locality the ordinary wet and dry bulbs are most convenient at all times and in that moist climate require but little attention. Of these observations, Professor Cleveland Abbe, of the Signal Office, Washington, has said "the hygrometric observations from the mountain stations

are of the highest importance. . . . . I manage daily to derive information which foretells the coming storm, and would do so far more accurately had we two other stations distant one to three hundred miles."

The hygrometer alone is a reliable instrument for determining the weather some time in advance of a change. On the mountain we could assure ourselves as to the weather for twelve to twenty-four hours; and after summer travel commenced our observations showed practical results daily; inasmuch as tourists stopping at the hotel availed themselves of the information thus gained in making their arrangements for the ensuing day.

It is the hygrometer upon which we depend more than the barometer. It is seldom that the readings of the wet and dry bulbs differ more than four or five degrees, quite rare that the difference is greater than ten. In this country as great a difference as thirty-five degrees has been recorded, and in India sixty degrees. I am led to believe that however unfavorable the climate is, in some respects, to health, the exemption from coughs and colds is due to this uniformly moist atmosphere.

THE WINDS.

The records show almost constant and exceedingly high velocities. Winds of from thirty to sixty miles an hour are the rule, light winds and calms the exception. In winter, ninety to one hundred miles is not uncommon, while in summer it seldom rises to ninety. The winter gales, which are westerly or northwest when attended by a low temperature, spend their fury in a gentle north wind bringing a moderation of temperature, quite frequently. This has been noticed by Dr. Hayes, by McClintock and Parry. I state the fact, but confess that I am unable to explain the phenomenon. Here, as in the Arctic zone,

there are high northerly winds excessively cold, and this seems to be the normal condition of things. On the mountain this gentle north wind will change suddenly, with a rising barometer, to south or southwest, which we can understand readily to be the downward movement of the southwest counter-trade descending to our level but not passing below it. A perfect calm is of the rarest occurrence in winter, for more than an hour or two. At Hanover for three months there were reported ninety-nine calms. Easterly winds are exceptional; out of two hundred and seventy observations, ten only were easterly. At Lunenburg seventy-three in the same time and Hanover forty-one. At Gorham, out of one hundred and forty-seven there were forty-one. This average holds nearly as good for the summer months. Three or four hundred feet greater elevation would place the summit above the course of the lowest surface winds. Neither do the northwest winds run much over a thousand feet higher. The altitude of 8,000 feet would undoubtedly give constant westerly winds.

From the direction and thickness of the cloud stratum, the height of the atmospheric current may be at all times determined. On the 23d of June at 7 A.M., the cloud enveloping the summit was unusually dense; the wind near the depot, southeast, in puffs, and calms, and nine miles per hour. On the roof of the hotel it was southwest and fifteen miles at least. An hour later the rain was pouring in torrents, and at the depot the wind had changed to southwest, thirteen miles an hour. These records show that gentle westerly winds may prevail on the summit, while below, at stations near and remote, the wind is easterly and tempestuous. They show, too, that the heavy gales of the winter were first felt on the mountain. The northwest wind sweeping southward, pushes up,

wedges itself under the current-trade, as it were (for atmospheric currents do not mingle, but stratify, the Huntonian theory to the contrary notwithstanding), gradually descending to the sea-level.

Of one summer high wind there is a partial report. June 8th at 5 P.M., the gale arose on the mountain reaching its height at 1 A.M., the 9th. At Bethlehem, N. H., fifteen miles west (1,800 feet above the level of the sea), there was a gentle breeze till 11 P. M., the 8th, but from that hour to 5 A.M., the 9th, the wind was high. At Bethlehem a cool, windy day followed, but on the mountain it was nearly calm and mild. Nor did it reach its highest point at Hanover till it had abated on Mount Washington.

CLOUDS.

It is obvious that the higher upper currents, especially of cirrus, which often floats at an elevation of 21,000 feet, will not present any very marked difference at the altitude of a little more than a mile. Generally it is during the transition stage into cirro-stratus or cirro-cumulus that we find this elevation advantageous. It becomes decidedly so when we would study the lower cloud-forms or observe the condensation of an approaching storm. As is well known, the higher upper current of cirrus is a westerly one, that it has a movement from west, or south of west, eastward. Passing into any sub-form the course may be from any point between S. S. W. and N. N. W. The lower currents of cumuli, which are rare in winter, and the stratus run low, seldom rising to the level of the summit. The stratus of winter is often extended over an area of several hundred square miles, and rarely has a greater average thickness, in the vicinity of the mountain, and probably not elsewhere, than 1,000 feet.

It is doubtful if, in this latitude, it ever exceeds 3,000

feet. Yet it is this thin stratum of cloud that gives the lowlands so many gloomy days in winter, while on the mountain there is no cloud from sunrise to sunset. It is on such days, when it is serene there and cloudy below, that we have a high temperature comparatively. This has been noticed in Europe. On the Brocken, in winter, under similar conditions, it is warmer than at Berlin.

In April there was the finest possible display of cumuli, an immense mass of cloud many thousand feet vertically and miles in extent. We may see the lower currents moving in different directions at the same time. Immediately around the mountains if they run low, they follow the line of the several ranges. It is not unusual at all seasons to see them on a S. E. course south of Mount Washington, and north of Mount Adams a S. W. one at the same time. Condensation may be going on at one point, in a contrary one, but a few miles distant, the cloud is re-dissolving. A distinguished French savant has said that he never saw, on the Alps, the formation of a cloud. A close observer, living on Mount Washington will have many opportunities to witness condensation over the summit. We did frequently, and Dr. Brewer of Boston has informed me that he once observed this on Mt. Washington.

[To be continued.]